- name of inspection personnel, pipeline station number, quantity and gauge of wire installed, and simple statement (e.g. "satisfactory") regarding proper installation. Provide field sketches where tabular data alone is not sufficient to document pipe alignment and bonding configuration.
- 5. Cleaning and Replacing Molds: Thoroughly clean mold and mold covers after completion of each weld to assure that no slag will penetrate into the next weld. Replace molds periodically and where there is pitting or other wear conditions.
- 6. Coating Thermite Welds: After soundness of the weld has been verified, thoroughly clean with a stiff wire brush and coat with an elastomeric cap. The elastomeric cap shall extend on all four sides beyond the cleaned area onto the pipe surface. Apply primer over the entire weld area and over the entire area where the elastomeric cap will be placed. Allow primer to dry. Push the dome of the prefabricated cap containing elastomeric material firmly into weld area. Lift the wire away from the pipe and apply the elastomeric material completely around and underneath the wire. Push the wire back down on the pipe.
- C. Bonded Joints: Install bond cables across each joint in accordance with and at locations indicated on the Drawings using the thermite weld process.
- 1. All new pipeline joints, including those on pipe, fittings, valves and branch connections including hydrants. Do not bond between new ductile iron and pre-stressed concrete
- D. Test Stations: Includes terminal box, concrete pad, guard post, survey marker, wire leads, PVC conduit, utility warning tape and monitoring equipment.
- 1. General: Type of test station; number, size and color of wires; and wire routing are shown on the Drawings. Unless otherwise noted or approved by the Engineer, test stations for pipelines buried under pavement shall be located outside paving limits. Test stations shall be sufficiently set back from vehicle traffic lanes so that they can be accessed for maintenance without extensive traffic control or other special safety precautions.
- 2. Wire Routing: Install test and monitoring equipment wires in a wiring harness arrangement routed along the bottom of the pipe trench where practical. Form harness by taping wires together at intervals of 10 feet. Install wires leaving the pipe trench in PVC conduit when terminal box is not installed over water main.
- Utility Warning Tape: Install 1 foot above PVC conduit.
- Concrete Pad:
- a. Concrete Pad: Provide for each flush mount test station. Non-reinforced concrete pad formed around test station shall be 24 inches by 24 inches by 8 inches sloped away from terminal box.
- E. Magnesium Anode Lead Wire Splices, Wire Connectors and Terminations:
- 1. Magnesium Anode Lead to Header Cable Splices: Splice the AWG No. 12 solid copper wire supplied with the anode to an AWG No. 8 HMWPE stranded copper cable through

- 2. Pipe-to-Soil Potential Measurements:
- a. Record at all test stations and hydrants used for post-backfill continuity
- b. Collect using a temporary copper/copper sulfate reference electrode placed on grade within one foot of test station and using buried reference electrode where
- c. Collect at all locations prior to connecting anodes at test stations, and then after anodes have been connected at all test stations for a minimum of 2 hours.
- 3. Pipe Current Flow Measurements:
- a. Record for all test stations having 4-wire current measuring spans. Documentation to include span length, magnitude and polarity of static voltage across pipe span, longitudinal resistance of span determined in a manner similar to post-backfill continuity test, and calculated magnitude and direction of current.
- b. Make static voltage measurements with positive terminal of voltmeter connected to black test wire (upstream or downstream of test station) and negative terminal connected to white wire (at test station). Static pipe current flow (magnitude and direction) to be calculated and recorded by dividing static voltage by span
- c. Collect at all locations prior to connecting anodes at test stations, and then after anodes have been connected at all test stations for a minimum of 2 hours.
- 4. Anode Potential and Current Measurements:
- a. Measure and record open-circuit potential between each anode cable at each test station and a temporary copper/copper sulfate reference electrode placed on grade within one foot of test station. Collect open circuit potential data with no other influencing anodes connected to main.
- b. Measure and record anode current at each test station using permanently installed current measuring shunt. Document shunt voltage drop, shunt resistance, and calculated current.
- c. Acceptance Criteria:
- Open-Circuit Potential: Magnitude 1.6 volts or greater.
- 2. Anode Current: Minimum 0.02 ampere per anode, adjusted to account for number of anodes included in circuit at any given location (e.g. 15 anodes minimum 0.30 ampere).

END OF SECTION 13110

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the use of a compression connector as shown. Tape the splice with three layers of high voltage rubber splicing tape (50% overlap), followed by three layers of vinyl electrical tape (50% overlap). Coat entire splice with electrical coating compound. Terminate the ends of the AWG No. 8 anode header cable in the test stations as

- 2. Terminal Board Connectors: Crimp and solder each terminal box wire to a one-hole terminal lug. Clean and dry wire and lug connector before soldering.
- 3. Wire Splicing: When wire splicing is required, use butt splice connector crimped, soldered, and insulated. Insulate splices by spirally wrapping (minimum 50 percent overlap) with three layers of rubber splicing electrical tape and three layers of vinyl plastic electrical tape. Coat taped splice with electrical coating compound.
- 4. General: No splices allowed in individual anode wires, joint bonds, and pipe wires.
- F. Magnesium Anodes:
- 1. Positioning: Horizontally or vertically to suit field conditions, with closest part of anode a minimum of 3 feet from main at or below elevation shown on Drawings. Spacing between anodes installed in a group is 10 feet unless noted otherwise.
- 2. Installation in Rock Areas: If solid rock is encountered at a depth which will not accommodate normal installation, investigate immediate proximity to determine if anode can be installed at specified depth at another location in the immediate area.
- 3. Backfill: Use soil free from rocks and organic material. Do not use sand or day. After anode is covered with 1 foot of soil, pour 15 gallons of water over covered portion of
- 4. Wiring: Unless noted otherwise, connect grouped anodes through a AWG No. 8 stranded copper header cable. Terminate each end of anode cable in designated test stations with only splicing of cable at anode wire attachments. Anode header cables shall be buried a minimum of 2 feet below grade. Handle wire with care.
- 5. Documentation: Include location and orientation of each anode on record Drawings.
- G. Clearance of Piping to Other Structures
- 1. 12 inches of natural clearance shall be maintained between the piping and other structures, where possible. When 12 inches of clearance cannot be maintained, install a medium density flexible polyethylene mesh pattern webbing pad, nominal thickness 0.156 inch, around piping and secure with non-metallic tape.
- H. Concrete Buttresses, Support Blocks, Anchor Blocks
- Position reinforcing rods used in the construction of support blocks, anchor blocks and other concrete structures so that they are not in contact with the piping. Maintain a minimum 2 inches of spacing between all reinforcing steel and the pipe and any pipe
- 2. When placing concrete in direct contact with ductile iron piping, apply the mastic

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coating to the external surface of the ductile iron piping prior to placing the concrete. Clean all dirt, moisture, oil, grease, and other contaminants from the piping surface. Thoroughly mix the mastic coating and apply a coat of approximately 12 mils of coating to the piping surface. Allow the coating to dry to touch (approximately 20 minutes) and apply a second coat of mastic of approximately 12 mils in thickness. Allow to dry before placing the concrete.

- I. Polyethylene Encasement: Install in accordance with ANSI/AWWA C105/A21.5.
- Contractor shall install 2 layers of 4 mil cross-laminated polyethylene over water mains 24-inch and above and 1 layer for water mains less than 24-inch at stream crossing locations, to the limits shown on the Drawings.
- 2. Overlapping Sections: Provide 2-foot overlap between sections of polyethylene. Completely tape overlapping sections to hold securely in place during backfilling, using compatible polyethylene tape.
- 3. Repair Of Openings in Encasement: Repair holes, slits, or openings of any size, to restore integrity of polyethylene in accordance with manufacturer's recommendation
- 4. Installation At Hydrants and Interconnections: Provide opening or other means at base of hydrant riser to avoid water accumulation under encasement because of water relief.
- 5. Backfill around polyethylene encasement shall be VDOT No. 21A stone, in accordance with the Stream Crossing Scour Protection detail on the Drawings.
- 3.02 TESTS
- A. GENERAL: Engineer will witness testing at his option and discretion.
- 1. Test Data Forms: Record test data in a uniform format pre-approved by the Engineer. Include test data, personnel, and instrumentation used on each sheet.
- Testing Summary:
- a. Pre-Backfill Tests:
- Bonded joint and test wire integrity
- b. Post-Backfill Tests:
- Pipe continuity test
- 2. Pipe-to-soil DC potential measurements
- 3. Pipe current flow measurements
- 4. Anode potential and current measurements
- c. Improper materials or installation determined by Contractor performed tests, and/or tests performed by the Engineer, shall be corrected by the Contractor.

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- 3. Schedule:
- a. Pre-Backfill Tests: Complete as work progresses.
- b. Post-Backfill Tests: Start no sooner than 2 months before scheduled application for
- c. Test Report: Letter of Compliance; Record Drawings: Submit no later than 10 working days before application for Beneficial Use.
- a. Raw test data for all pre-backfill and post-backfill tests.

b. Test set-ups and schematics.

- Summary tabulations and theoretical calculations.
- d. Letter of Compliance.
- e. Record Drawings.
- B. Pre-Backfill Test Procedures:
- 1. Bonded joint and test wire integrity tests:
- a. Conduct visual inspection and hammer test including required documentation per installation section of this Specification.
- C. Post-Backfill Test Procedures:
- 1. Pipe Continuity Tests:
 - a. Measure and record longitudinal resistance of pipe between consecutive test stations, and between test stations and intermediate hydrant laterals. Determine resistance using Ohm's Law by impressing a direct test current across pipe span and measuring resultant voltage drop across same span. Use of temporary test points at locations other than test stations and hydrants require approval by the
 - b. Documentation: Include applied test current, measured voltage before application of current, with current applied and immediately after interrupting test current, calculated resistance and corresponding theoretical resistance (Paragraph C below) in test report.
 - c. Acceptance Criteria: Maximum acceptable span resistance 110% of the sum of:
 - 1. Number of pipe joints multiplied by theoretical resistance of a joint bond, determined by number of bond wires per joint and wire gauge.
 - 2. Length of pipe multiplied by theoretical resistance per unit length, determined by pipe diameter, wall thickness and resistivity.

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O. DATE BY REVISION

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LOUDOUN COUNTY SANITATION AUTHORITY 880 HARRISON STREET, SE **LEESBURG, VIRGINIA 20175** (703) 771-1095

CORROSION CONTROL DETAILS



SCALE HORIZ: AS SHOWN VERT: AS SHOWN

DATE:____

DRAWN BY:

APPROVED BY:_

RJR CADD FILE CHECKED BY:_

JOB NO.

PROJECT NO

LOUDOUN COUNTY SANITATION AUTHORITY RT. 607 AND RT.7 30" WATER MAIN LOUDOUN COUNTY, V.A.

DRAWING

SHEETS